Descriptions of Two New Species of *Pratylenchus* (Tylenchida: Pratylenchidae) from Japan

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Two new species of *Pratylenchus* from forest soil in Japan are described and illustrated. *P. yamagutii* n. sp. from Mt. Eniwa, Hokkaido is characterized by two head annuli, rounded spermatheca, and presence of males. This new species is similar to *P. coffeae, P. alleni* and *P. neglectus*, but differs from the first species in the shorter body, smaller b-value and dumbbell shaped submedian face segment; from the second in the longer stylet, rounded to oval spermatheca and slender tail; and from the third in the presence of males, more tail annuli and anterior location of phasmids in tail. *P. okinawaensis* n. sp. from Kunigami, Okinawa has two head annuli, crenate tail terminus and oblong spermatheca. This new species resembles *P. flakkensis* in the shape of the tail terminus, but can be separated from the latter by the oblong spermatheca and larger V-value. *Jpn. J. Nematol.* **21** : 18-25 (1991).

Key words : *Pratylenchus yamagutii* n. sp., *Pratylenchus okinawaensis* n. sp., taxonomy, forest soil, Japan.

The genus *Pratylenchus* is one of the most intensively surveyed plant-parasitic nematode genera in Japan. More than 18 species have been recorded from this country up to the present time. Of them, especially *P. coffeae* and *P. penetrans*, are known to be serious pests in agricultural fields[3, 11] and forest nurseries[4, 7]. Recently two additional species to the Japanese fauna of this genus were obtained from the rhizosphere of woody plants in Hokkaido and Okinawa. They are described as new species herein.

MATERIALS AND METHODS

Nematodes were killed by gentle heat and subsequently fixed by TAF fixative. For optical microscope observation, they were processed by the modified slow method, and mounted in pure glycerin. For SEM observation, nematodes fixed by TAF were dehydrated through the series of ethanol from 50% to 100%, dried from pure ethanol by a critical point dryer in liquid CO_2, sputter coated with 300 Å platinum-vanadium, and observed using a Hitachi X-650 SEM at 20 kV.

Pratylenchus yamagutii n. sp.
(Figs. 1, 2)

MEASUREMENTS. *Females.* Holotype : L=409 μm, a=24.1, b=4.9, b'=3.6, c=18.6, c'=2.2, V=79.1, stylet=16.0 μm. Paratypes (part): n=25, L=330-528 μm (406±39.6 μm; mean±standard deviation), a=19.1-27.4 (23.9±1.74), b=4.4-5.9 (5.2±0.36), b'=2.9-4.2 (3.5±0.31), c=15.7-20.9 (18.8±1.37), c'=1.5-2.5 (2.1±0.27), V=77.4-82.1 (79.3±1.54), E.P. (distance from head end to excretory pore divided by the bogy length) =16.7-20.4% (18.5±0.84), stylet=15.3-18.0 μm (16.2±0.59).

Males. Paratypes : n=17, L=328-409 μm (361±19.5), a=22.7-26.7 (24.6±1.25), b=4.1-5.0 (4.5±0.33), b'=2.9-4.0 (3.4±0.23), c=18.1-21.0 (19.7±0.92), c'=1.6-2.3 (1.9±0.20), T=34.5-53.6

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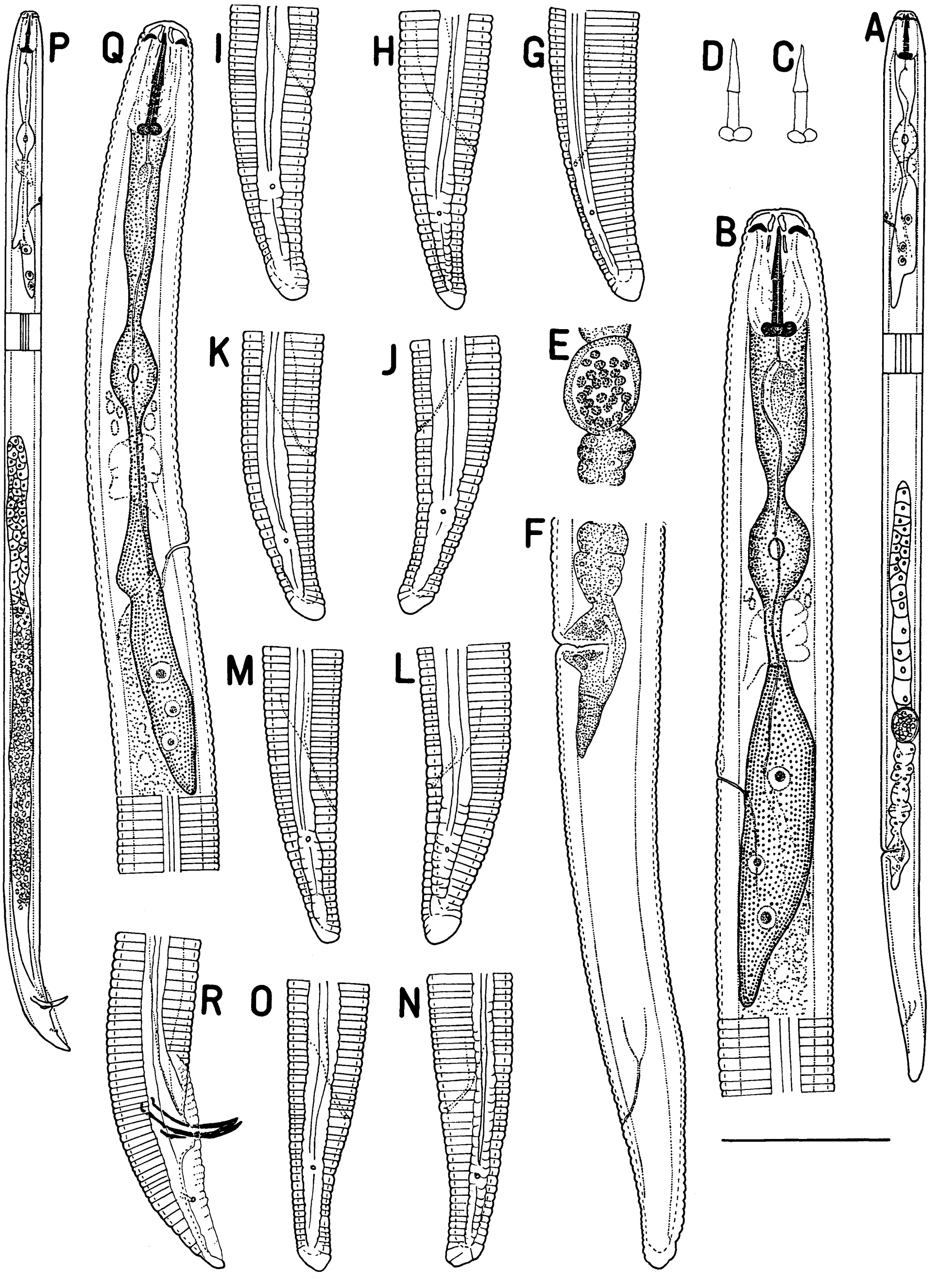

Fig. 1. *Pratylenchus yamagutii* n. sp. A-M : female. A : general view, B : anterior body, C-D : stylet, E : spermatheca, F : posterior body, G-O : tail. P-R : male. P : general view, Q : anterior body, R : posterior body. Scale bar indicates 67 μm for A, P, and 25 μm for the rest.

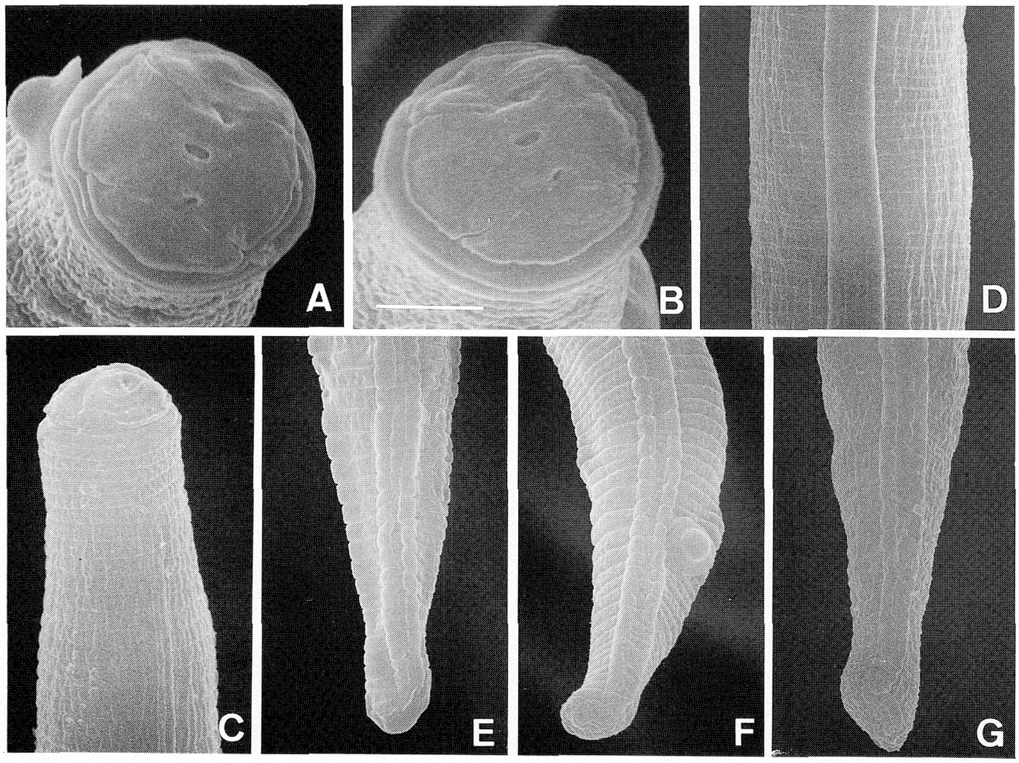

Fig. 2. *Pratylenchus yamagutii* n. sp. Female. A-B : face, C : head, D : lateral field, E-G : tail. Scale bar indicates 2.5 μm for A-B, and 5 μm for C-G.

(45.0±4.93), E.P.=16.5-20.6% (19.0±1.07), stylet=13.3-16.0 μm (14.6±0.56), spicule=12.0-15.0 μm (14.4±0.83), gubernaculum=3.7-5.0 μm (4.1±0.45).

DESCRIPTION. *Female.* Body strongly to slightly curved ventrally after gentle heat treatment. Body annuli fine, 0.7-1.2 μm (1.0±0.14, n=25) wide around mid-body (Fig. 1 B). Lateral field 4.0-7.0 μm (5.1±0.77) wide, with four incisures, outer pair smooth in mid-body and crenate near the posterior terminus; inner pair faint, with an additional line in some specimens (Fig. 2 D), fused to one around phasmids. Head region low, flattened, with two annuli (Figs. 1 B, 2 D) occasionally with three annuli (one out of 25 females measured), or three annuli on either side (three out of 25 females), slightly setoff from body contour, cephalic framework generally extending into body one or one-and-half annuli. In face view, sub-dorsal and sub-ventral segments of the first head annule fused to oral disc, narrowing at their inner extremity and widening towards the rounded outer edge of face (Figs. 2 A, B). Stylet rigid, knobs rounded to slightly sloping anteriorly or posteriorly in anterior surface, 2.0-2.7 μm (2.5±0.22) high and 4.3-5.0 μm (4.7±0.28) wide; dorsal orifice of esophageal gland at 2.7-4.7 μm (3.5±0.22) from the stylet base. Median bulb massive, slightly oval, 10.3-14.7 μm (12.5±1.10) long, 8.7-10.3 μm (9.3±0.49) wide, valve moderately developed. Nerve ring surrounding isthmus. Esophageal gland lobes overlapping intestine ventrally and laterally (Figs. 1 A, B), 25.9-54.5 μm (36.7±7.66) extending from esophago-intestinal junction, 1.5-3.4 times the corresponding body width. Hemizonid two or three annuli long. Excretory pore immediately posterior to hemizonid, 54.7-95.3 μm (75.3±7.00) from lip. Reproductive system moderately developed. Spermatheca rounded to oval (L/W=1.0-1.8, 1.4±0.20), 8.2-16.7 μm (13.4±2.19) in length, 7.7-14.0 μm (9.9±2.27) in width, filled with rounded spermatozoa (Fig. 1 E). Vulva around 80% of body from lip; post-vulval uterine branch 13.0-19.3 μm (16.7±2.27) long, 0.7-1.3 (1.0±0.17) times body width at vulva (Fig. 1 F). Tail 18.0-30.0 μm (20.7±4.1) long with 17-25 annuli (20.1±2.12), and terminus rounded without distinct annulation (Figs. 1 G-O, 2 E-G). Phasmids usually located at the anterior half of tail, 4-12 annuli (7.5±2.29) posterior to anus, 12.0-20.0 μm (14.3±1.99) from tail end.

Male. Body and stylet shorter than those of female, but in other aspects similar to female except for reproductive system (Fig. 1 P, Q). Testis single, outstretched; cloacal prominence small; spicules arch shaped; gubernaculum simple, crescent (Fig. 1 R). Bursa surrounding tail tip; phasmids rod like, located on bursa, around middle of tail.

TYPE LOCALITY AND HABITAT. The summit of Mt. Eniwa (1,320 m alt.), Hokkaido, Japan, from the rhizosphere of *Weigela middendorffiana* (CARRIERE) K. KOCH and *Almus crispa maximowiczii* (CALL.) HULT.

TYPE SPECIMENS. Holotype, collected by N. MINAGAWA in June 24, 1986, are deposited at the National Institute of Agro-Environmental Sciences (NIAES), Tsukuba, Ibaraki, Japan. Paratypes: 50 females and 17 males. Paratypes of five females and one male will be distributed to each of the following institute: USDA Nematode Collection, Beltsville, Maryland, U.S.A. (USDANC); University of California, Davis, California, U.S.A. (UCD); Rothamsted Experimental Station, Harpenden, Herts., England (RES); Department of Nematology, Agricultural University, Wageningen, The Netherlands (AUW); and Laboratoire des Vers, Muséum National d'Histoire Naturelle, Paris, France (MNHNP). Remaining specimens will be retained at NIAES.

DIAGNOSIS AND RELATIONSHIPS. *P. yamagutii* n. sp. is characterized by the two head annuli, dumbbell shaped lateral segment of face, rounded and smooth tail terminus, anterior half location of phasmids in tail, rounded to oval spermatheca filled with rounded spermatozoa, and common occurrence of males.

This new species most resembles *P. coffeae* (ZIMMERMANN, 1898) FILIPJEV & SCHUURMANS STEKHOVEN, 1941[5, 6], but it can be separated from it by the shorter body (406 (330-528) μm *vs*. 530 (370-700) μm), smaller b-value (5.2 (4.4-5.9) *vs*. 6.8 (5.0-7.8)) and dumbbell shaped lateral face segment (fused type in the latter). It is also similar to *P. alleni* FERRIS, 1961[2], but differs from it in the longer stylet (16.2 (15.3-18.0) μm *vs*. 14 (13.5-15) μm), rounded to oval spermatheca (never oval in *P. alleni*) and slender tail instead of broad one. In the general shape of the body and face view (Group 2 *sensu* CORBETT & CLARK[1]), *P. yamagutii* n. sp. resembles *P. neglectus* (RENSCH, 1924) FILIPJEV & SCHUURMANS STEKHOVEN, 1941, however, the new species is distinguished from the latter by the common occurrence of males, the presence of the filled spermatheca, more tail annuli, and anterior location of phasmids in tail[10].

Specimens were obtained at the summit (1,320 m alt.) of Mt. Eniwa. It is noteworthy that only *P. penetrans* was detected from the foot (300 m alt.) of this mountain. A bacterial parasite *Pasteuria penetrans* was commonly attached to the body surface of this species (Fig. 2 A, F).

The name of the present new species is in honor of Suteo YAMAGUTI, who first reported the occurrence and injury of a root-lesion nematode (recorded as *P. pratensis*, but presumably *P. penetrans*) in Japan[12].

Pratylenchus okinawaensis n. sp.

(Figs. 3, 4)

MEASUREMENTS. *Female*. Holotype: L=456 μm, a=24.4, b=5.4, b'=3.4, c=18.2, c'=3.4, V=78.5, stylet=17.0 μm. Paratypes (part): n=25, L=392-514 μm (457±33.1), a=21.0-29.3 (24.9±1.66), b=4.7-6.0 (5.3±0.24), b'=2.9-5.0 (3.7±0.37), c=15.6-21.4 (18.3±1.33), c'=1.6-2.9 (2.3±0.31), V=77.4-81.7 (79.2±1.33), E.P.=16.0-20.3% (19.0±0.76), stylet=16.0-18.0 μm (17.2±0.58).

Male. Paratypes (Part): n=24, L=367-489 μm (429±26.7), a=23.9-31.1 (27.3±1.81), b=

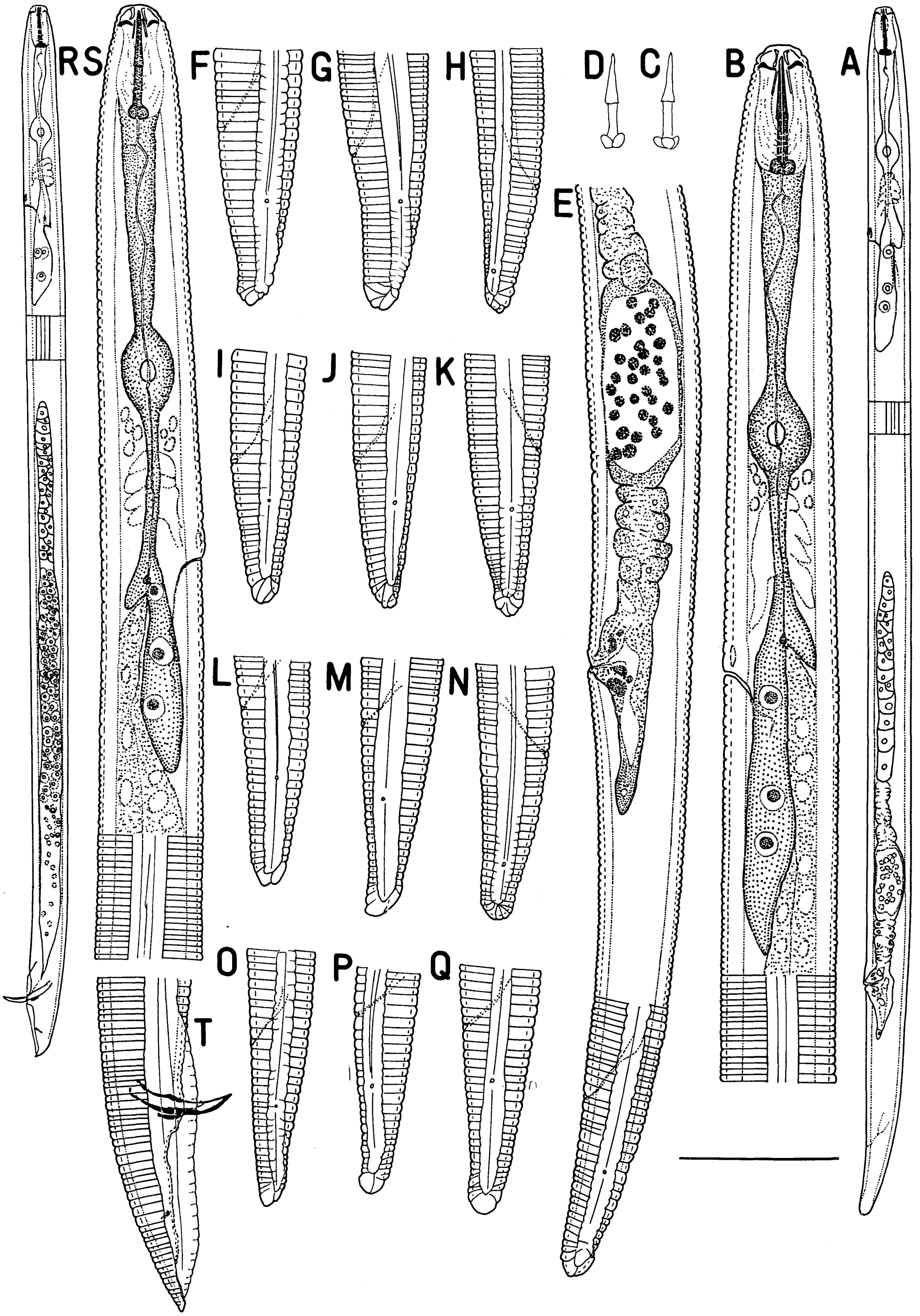

Fig. 3. *Pratylenchus okinawaensis* n. sp. A–Q : Female. A : general view, B : anterior body, C–D : stylet, E : posterior body, F–Q : tail. R–U : Male. R : general view, S : anterior body, T : posterior body. Scale bar indicates 67 μm for A, R, and 25 μm for the rest.

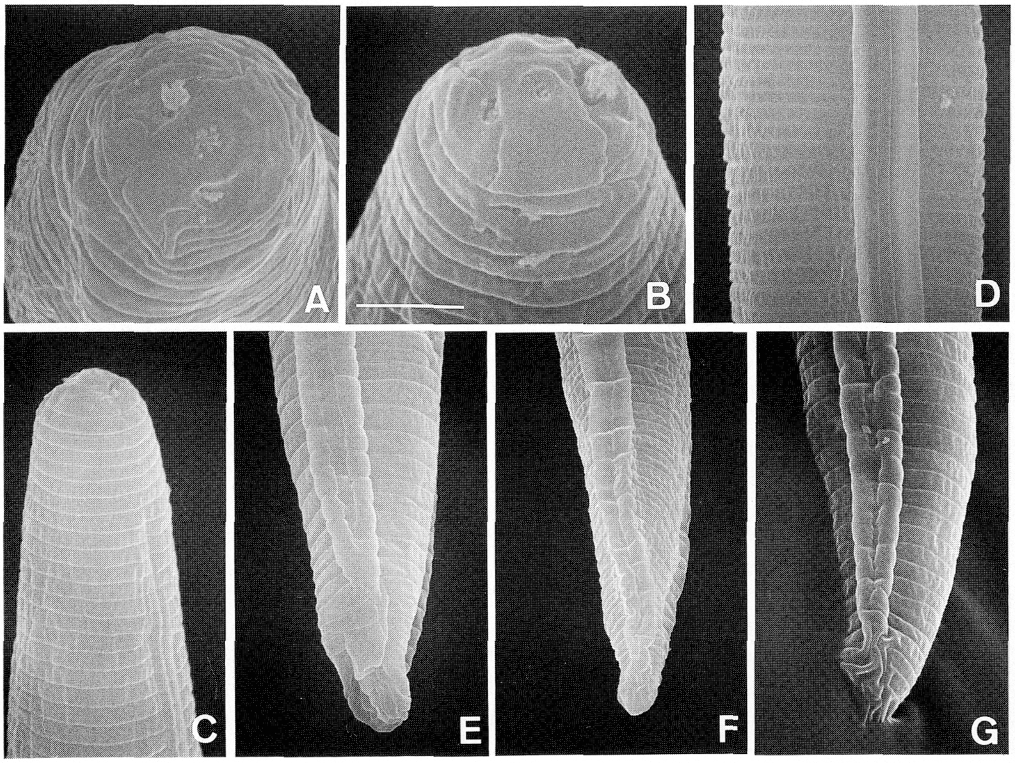

Fig. 4. *Pratylenchus okinawaensis* n. sp. Female. A-B : face, C : head, D : lateral field, E-G : tail. Scale bar indicates 2.5 μm for A-B, and 5 μm for C-G.

4.2-5.8 (5.1±0.41), b'=3.5-4.4(4.0±0.30), c=13.9-19.6 (16.8±1.38), c'=2.0-2.7 (2.3±0.21), T=35.2-63.1 (52.0±8.01), E.P.=16.7-20.5% (18.7±0.85), stylet=14.3-17.0 μm (16.0±0.63), spicule=16.7-19.3 μm (17.8±0.74), gubernaculum=3.3-4.7 μm (3.9±0.36).

DESCRIPTION. *Female*. Body straight or slightly curved ventrally after treatment by gentle heat; narrowing behind vulva to broad rounded tail terminus and to flattened lip at anterior end, finely annulated (Fig. 3 A). Head with two annuli (Fig. 3 B), rarely three (one of 25 females measured), setoff from body by a small constriction (Figs. 3 B, 4 C). Cephalic framework moderately sclerotized, extending into body mostly one annule, occasionally one-and-half to two annuli. In face view (Fig. 4 A, B), sub-dorsal and sub-ventral sectors fused to oral disc and forming angular and broad dumbbell shape but not typical; oral opening oval, surrounded by six small pores around it on convex edge of opening. Stylet moderate (Fig. 3 C, D); knobs rounded, 2.3-3.0 μm (2.7±0.15) high, 3.3-6.3 μm (3.9±0.25) across. Dorsal esophageal gland orifice 2.0-3.7 μm (2.7±0.41) behind stylet base. Median bulb oval, well developed, nerve ring around isthmus; esophageal lobes overlapping intestine ventrally and laterally; esophageal-intestinal junction around level of excretory pore. Excretory pore 77.2-93.3 μm (86.6±4.63) from lip, immediately posterior to hemizonid, which is two or three annuli long. Reproductive system single; spermatheca oval to elongate oval (L/W=1.7-4.9, 2.9±0.97), 16.0-50.0 μm (32.6±9.27) long and 8.0-13.3 μm (11.2±1.29) wide, filled with rounded spermatozoa (Fig. 3 E). Post-vulval uterine branch undifferentiated, 13.3-28.3 μm (20.4±3.8) long, 0.8-1.3 times (1.0±0.13) body width at vulva. Tail 20.0-30.0 μm (25.4±1.60) long, with 17-25 annuli (21.2±2.25), terminus serrate or irregularly annulated (Figs. 3 F-Q, 4 E-G). Phasmids usually at the anterior half of tail, 13.0-18.7 μm (16.1±1.75) from tail end. Lateral field with four incisures (Fig. 4 D), outer lines irregularly crenate in tail region.

Male. Body slender (Fig. 3 R), slightly curved ventrally by gentle heat treatment. Esophagus and stylet similar to female but less developed (Fig. 3 S). Lateral field with four incisures and oblique striae in central zone in some specimens and terminating on bursa. Gonad single with outstretched testis. Spicules arched to blunt point; gubernaculum crescent (Fig. 3 T). Phasmids rod like, usually at a median position of the tail.

TYPE LOCALITY AND HABITAT. Specimens were collected from the Experimental Forest of the University of Ryukyu, Yona, Kunigami, Okinawa, Japan, in the rhizosphere of the following plants: *Kalopanax pictus* (THUNB.) NAKAI, *Glochidion triandrum* (BLANCO) C.B. ROBINSON, *Macaranga tanarius* MUEL.-ARG., *Daphniphyllum teijsmannii* ZOLL., *Piottosporum tobira* (THUNB.) AITON, *Litsea acuminata* (BL.) KURATA, Persea japonica (SIEB. & ZUCC.) KOSTERM., *Cryptomeria japonica* (L.f.) D. DON, and *Pinus luchuensis* MAYR.

TYPE SPECIMENS. Holotype: female, collected by N. MINAGAWA on March 4, 1986 and deposited at NIAES. Paratypes: 100 females, 50 males (same data as holotype). Five females and 2 males will be deposited at to each of the following institutes: USDANC, UCD, RES, AUW, and MNHNP. Remaining specimens will be retained at NIAES.

DIAGNOSIS AND RELATIONSHIPS. *P. okinawaensis* n. sp. is characterized by the combination of two lip annuli, crenate and rounded tail terminus, and elongate oval spermatheca filled with spermatozoa.

By these characters, this new species comes close to *P. flakkensis* SEINHORST, 1968, but differs from it in larger V-value (77.3-81.6% *vs.* 73-77%)[9, 13]. This new species also resembles *P. gibbicaudatus* MINAGAWA, 1982[8] and *P. yassini* ZEIDAN & GERAERT, 1991[14] by the morphology of the tail terminus, but it can be distinguished from the former by the longer stylet (16.0-18.0 μm *vs.* 13.9-16.4 μm), larger V-value (70-73% in *P. gibbicaudatus*), and rounded tail terminus (usually truncate and occasionally bifurcate in the latter); and from the latter by the smaller number of lip annuli (2 *vs.* 3)[14].

Lateral edges of the sub-median sectors of the first lip annule of this species are irregularly shaped (Fig. 4 A, B), and seems to be intermediate between those of Group 2 (rounded dumbbell shaped patterns and analogies) and Group 3 (angular dumbbell shaped patterns) *sensu* CORBETT and CLARK[1].

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和文摘要

日本産ネグサレセンチュウ属の2新種の記載

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我が国の森林土壌から検出されたネグサレセンチュウ属の2新種を記載した。*Pratylenchus yamagutii* n. sp.は、北海道恵庭岳のミヤマハンノキ及びウコンウツギから検出され、2個の頭部体環、丸い受精嚢、雄が存在する等の特徴を有する。本種は、ミナミネグサレセンチュウ（*P. coffeae*），*P. alleni* 及びムギネグサレセンチュウ（*P. neglectus*）に似るが、最初の種とは体長が短く、b値が小さい、また、頭部正面像が亜鈴型である等の違いが認められる。2番目の種とは、口針が長く、受精嚢が丸ないし卵型、尾部が細い等の違いがある。3番目の種とは、雄成虫が存在し、受精嚢に球形の精子が見られること、尾部体環の数が多いこと、幻器が尾部の前半部に位置することから区別される。*P. okinawaensis* n. sp.は、沖縄県国頭村の琉球大学演習林のリュウキュウハリギリ、ウラジロカンコノキ、オオバギ、ヒメユズリハ、トベラ、バリバリノキ、ボソバタブ、スギ及びリュウキュウマツから検出され、2個の頭部体環、長円形の受精嚢、尾部先端に切れ込みを有する等の特徴を持つ。本種は、*P. flakkensis* に最も似るが、受精嚢がより長いこと、V値が大きいことから区別可能である。